AMENDMENTS TO THE CLAIMS

Claim 1 (currently amended): A method for reducing the temperature in a vertical-cavity surface-emitting laser (VCSEL), the method comprising:

forming at least one heat spreading layer between an active layer and at least one reflecting surface in a VCSEL;~~ and~~

forming at least one metal contact adjacent the at least one heat spreading layer for permitting current to be injected through the at least one heat spreading layer, the current bypassing the at least one reflecting surface; and

permitting for reduction of the VCSEL temperature by allowing heat to bypass the at least one reflecting surface and pass through the at least one ~~thermally conductive InP~~ heat spreading layer, wherein the at least one heat spreading layer has a higher thermal conductivity relative to the at least one reflecting surface.

Claim 2 (previously amended): The method according to claim 1, including doping the at least one of the heat spreading layers with an n-type material.

Claim 3 (previously amended): The method according to claim 2, wherein the doping with the n-type material is effected by an InP compound.

Claim 4 (previously amended): The method according to claim 1, further including forming a Distributed Bragg Reflector (DBR) as part of the at least one reflecting surface.

Claim 5 (previously amended): The method according to claim 1, further comprising the step of forming a tunnel junction between an apertured active layer and the at least one of the reflecting surfaces.

Claim 6 (previously amended): The method according to claim 1, further including an alloy of InAlGaAs, in the active layer, substantially lattice matched to InP.

Claim 7 (previously amended): The method according to claim 1, further including an alloy of InGaAsP, in the active layer, substantially lattice matched to InP.

Claim 8 (previously amended): The method according to claim ~~5~~ 1, further including an alloy of InGaAs, in the active layer, substantially lattice matched to InP.

Claim 9 (previously amended): The method according to claim 4, further including alternating layers of $Al_{a1}Ga_{1-a1}As_bSb_{1-b}$ and $Al_{a2}Ga_{1-a2}As_bSb_{1-b}$ in the DBR.

Claim 10 (previously amended): The method according to claim 9, further including the step of assigning b greater than about 0.5, a1 greater than about 0.9, and a2 less than about 0.3.

Claim 11 (previously amended): The method according to claim 4, further including an undoped DBR.

Claim 12 (currently amended): The method according to claim 1, ~~further effecting~~ wherein the VCSEL ~~to exhibit~~ exhibits continuous wave operation at temperatures greater than about 80 degrees Celsius.

Claim 13 (previously amended): The method according to claim 5, further including an n-type InP and p-type InAlAs in the tunnel junction.

Claim 14 (currently amended): The method according to claim 1, further providing a thickness of about 1-3λ times the optical wavelength to the at least one heat spreading layer.

Claim 15 (cancelled)

Claim 16 (currently amended): A method for reducing the thermal impedance in a vertical-cavity surface-emitting laser (VCSEL) , the method comprising:

forming a first thermally conductive InP heat spreading layer between a first reflecting surface and an active layer in a VCSEL;

forming a second thermally conductive InP heat spreading layer between a second reflecting surface and the active layer in a VCSEL;~~-and~~

forming at least one metal contact adjacent the first thermally conductive InP heat spreading layer for permitting current to be injected through the at least one InP heat spreading layer, the current bypassing the first reflecting surface; and

said first and second heat spreading layers reduce the thermal impedance in the VCSEL by allowing ~~an~~ the injected current to bypass the reflecting surfaces, wherein the first and second heat spreading layers have a higher thermal conductivity relative to the first and a second reflecting surfaces.

Claim 17 (previously amended): The method according to claim 16, wherein the forming steps include doping the heat spreading layers with an n-type material.

Claim 18 (previously amended): The method according to claim 17, including effecting the doping with the n-type material with an InP compound.

Claim 19 (previously amended): The method according to claim 16, further including forming a Distributed Bragg Reflectors (DBRs) as part of the first and the second reflecting surfaces.

Claim 20 (previously amended): The method according to claim 16, further comprising the step of forming a tunnel junction between an apertured active layer and the first reflecting surface.

Claim 21 (previously amended): The method according to claim 16, further including an alloy of InAlGaAs, in the active layer, substantially lattice matched to InP.

Claim 22 (previously amended): The method according to claim 16, further including an alloy of InGaAsP, in the active layer, substantially lattice matched to InP.

Claim 23 (previously amended): The method according to claim 16, further including an alloy of InGaAs, in the active layer, substantially lattice matched to InP.

Claim 24 (previously amended): The method according to claim 19, further including alternating layers of $Al_{a1}Ga_{1-a1}As_bSb_{1-b}$ and $Al_{a2}Ga_{1-a2}As_bSb_{1-b}$ in the DBR.

Claim 25 (previously amended): The method according to claim 24, further including the step of assigning b greater than about 0.5, a1 greater than about 0.9, and a2 less than about 0.3.

Claim 26 (previously amended): The method according to claim 19, further including undoped DBRs.

Claim 27 (currently amended): The method according to claim 16, ~~further effecting~~ wherein the VCSEL ~~to~~ exhibits continuous wave operation at temperatures greater than about 80 degrees Celsius.

Claim 28 (previously amended): The method according to claim 20, further including an n-type InP and p-type InAlAs in the tunnel junction.

Claim 29 (currently amended): The method according to claim 16, further providing a thickness of about 1-3λ times the optical wavelength to each of the heat spreading layers.

Claim 30 (cancelled)

Claim 31 (currently amended): A vertical-cavity surface-emitting laser (VCSEL) operating at a reduced temperature, the VCSEL comprising:

a first and a second reflecting surfaces in a VCSEL;

an active layer in the VCSEL;

a first and a second thermally conductive InP heat spreading layers in the VCSEL, said first heat spreading layer being in between the first reflecting surface and the active layer, and the second heat spreading layer being in between the second reflecting surface and the active layer;~~ and~~

an at least one metal contact adjacent the first thermally conductive InP heat spreading layer for permitting current to be injected through the at least one InP heat spreading layer, the current bypassing the first reflecting surface; and

the first and second heat spreading layers allowing heat generated in the VCSEL to bypass the first and second reflecting surfaces due to the higher thermal conductivity of the first and second heat spreading layers relative to the first and a second reflecting surfaces, thereby reducing the temperature of the VCSEL.

Claim 32 (cancelled)

Claim 33 (new): A method for reducing the thermal impedance in a vertical-cavity surface-emitting laser (VCSEL) , the method comprising:

forming a first thermally conductive n-doped InP heat spreading layer between a first reflecting surface and an active layer in a VCSEL;

forming a second thermally conductive n-doped InP heat spreading layer between a second reflecting surface and the active layer in a VCSEL;

forming at least one metal contact adjacent the first thermally conductive InP heat spreading layer for permitting current to be injected through the at least one InP heat spreading layer, the current bypassing the first reflecting surface; and

said first and second heat spreading layers reduce the thermal impedance in the VCSEL by allowing the injected current to bypass the reflecting surfaces, wherein the first and second heat spreading layers have a higher thermal conductivity relative to the first and a second reflecting surfaces.

Claim 34 (new): A vertical-cavity surface-emitting laser (VCSEL) operating at a reduced temperature, the VCSEL comprising:

a first and a second reflecting surfaces in a VCSEL;

an active layer in the VCSEL;

a first and a second n-type doped thermally conductive InP heat spreading layers in the VCSEL, said first heat spreading layer being in between the first reflecting surface and the active layer, and the second heat spreading layer being in between the second reflecting surface and the active layer;

an at least one metal contact adjacent the first thermally conductive InP heat spreading layer for permitting current to be injected through the at least one InP heat spreading layer, the current bypassing the first reflecting surface; and

the first and second heat spreading layers allowing heat generated in the VCSEL to bypass the first and second reflecting surfaces due to the higher thermal conductivity of the first and second heat spreading layers relative to the first and a second reflecting surfaces, thereby reducing the temperature of the VCSEL.